Lower Pleistocene Fan 1 Play
LPL F1, #0781
Valvulineria "H" and *Lenticulina* 1

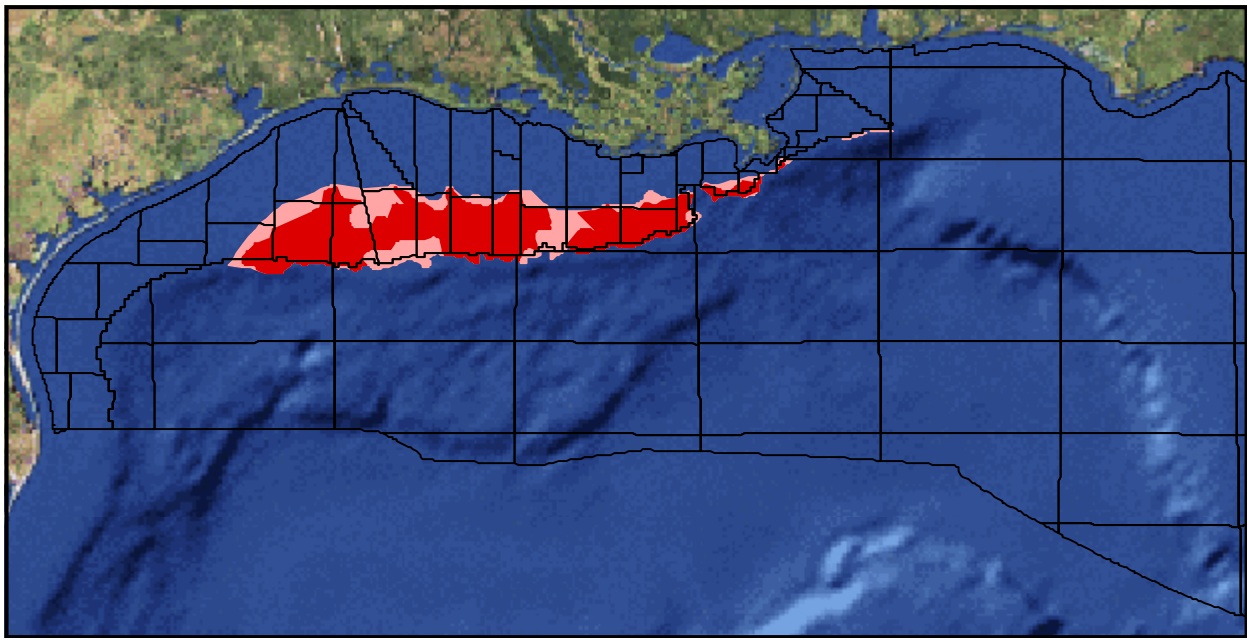

Figure 160. LPL F1 map showing location of play. Play limit shown in light red; hydrocarbon limit shown in dark red.

Overview

The Lower Pleistocene Fan 1 Play (LPL F1) contains reserves of 10,104.423 Bcfg and 703.074 MMbo (2,501.014 MMBOE) in 543 sands in 118 fields. Comparing all 65 GOM plays, LPL F1 ranks fifth in gas reserves (6%). Additionally, comparing the 15 F1 fan plays, LPL F1 ranks first in oil reserves (41%) and gas reserves (39%). The play extends discontinuously along and updip from the modern GOM shelf edge from the Galveston/East Breaks to Viosca Knoll Area (Figure 160).

Description

LPL F1 is defined by (1) a deep-sea fan depositional style representing sediments deposited basinward of the shelf edges associated with the LPL Chronozone, (2) an extensional structural regime with salt-withdrawal basins and extensive listric, growth faulting rooting into salt detachments on the modern GOM shelf, and (3) the LPL-1 and LPL-2 Chronozones, the tops of which are defined by the *Valvulineria* "H" and *Lenticulina* 1 biozones, respectively (Figure 8).

LPL F1 extends discontinuously along and updip from the modern GOM shelf edge from the southern Galveston/northern East Breaks Area offshore Texas to the Viosca Knoll Area east of the modern Mississippi River Delta (Figure 160). Hydrocarbons have been encountered in much of that same area. Located mainly on the modern GOM shelf, LPL F1 is relatively well explored.

The ancestral Mississippi River Delta System dominated deposition of the play's sediments. As compared with the underlying Upper Pliocene (UP) Chronozone, the shelf edge offshore Louisiana of the LPL Chronozone occurs farther out in the GOM Basin because of the basinward progradation of the ancient delta system.

Play Limits

In an updip direction, the play is bounded by the LPL-1 shelf edge, the farthest updip shelf edge associated with the LPL Chronozone, and grades into the sediments of the Lower Pleistocene Progradational Play (LPL P1). To the northeast, LPL F1 deposits grade into the sediments of LPL P1 and the Lower Pleistocene Fan 2 Play (LPL F2). LPL F1

does not extend farther to the west because of an apparent lack of shelf source sands in offshore Texas during LPL time. Downdip, LPL F1 is limited by LPL F2.

Depositional Style

LPL F1 is characterized by deep-sea fan systems deposited basinward of the LPL-1 shelf edge. Component facies include channel/levee complexes, sheet-sand lobes, interlobe/fringe sediments, and slump sediments that were deposited on the LPL-1 and LPL-2 upper and lower slopes, in topographically low areas between salt structure highs, and abyssal plains. These deep-sea fan systems are often overlain by thick shale intervals representative of zones of sand bypass on the shelf, or sand-poor zones on the slope.

The LPL deep-sea fan interval varies from less than 50 to more than 9,600 ft in thickness, with net sand thicknesses as much as approximately 2,400 ft. Although individual sands are commonly from a few to tens of feet thick, they can exceed hundreds of feet in thickness. Sand-dominated successions comprising deposits of multiple sheet-sand lobes are more than 1,000 ft thick, with intervening shale sequences reaching as much as several thousands of feet in thickness. Thick, upward-coarsening and thinner, upward-fining log patterns of sand-dominated intervals represent sheet-sand lobe progradation and channel fill/abandonment, respectively, in proximal-fan areas. Irregularly stratified sand successions displaying spiky log patterns suggest deposition in distal-fan areas.

Structural Style

Almost one-third of the fields in LPL F1 are structurally associated with salt diapirs—shallow, intermediate, and deep depths—with hydrocarbons trapped on diapir flanks or in sediments draped over diapir tops. Another third of the fields are structurally associated with anticlines and growth fault anticlines. Less common structures in the play are normal faults, and a few fields contain hydrocarbon accumulations trapped by permeability barriers and updip pinchouts or facies changes.

Quantitative Attributes

On the basis of reserves calculations, LPL F1 is 72% gas and 28% oil. The 543 sands in the play comprise 1,097 reservoirs, of which 664 are nonassociated gas, 332 are undersaturated oil, and 101 are saturated oil. Proved reserves are estimated at 10,086.503 Bcfg and 702.989 MMbo (2,497.740 MMBOE) in 539 sands in 115 fields (Table 73). Unproved reserves are estimated at 17.920 Bcfg and 0.085 MMbo (3.274 MMBOE) in 4 sands in 3 fields. These proved plus unproved reserves account for 26% of the reserves for the LPL Chronozone.

	No. of Sands	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
Proved	539	702.989	10,086.503	2,497.740
Cum. production	493	561.383	8,176.094	2,016.204
Remaining proved	352	141.606	1,910.409	481.537
Unproved	4	0.085	17.920	3.274

Table 73. LPL F1 reserves and cumulative production.

Cumulative production from LPL F1 totals 8,176.094 Bcfg and 561.383 MMbo (2,016.204 MMBOE) from 493 sands in 113 fields. LPL F1 production accounts for 27% of the LPL Chronozone's total production. Remaining proved reserves in the play are 1,910.409 Bcfg and 141.606 MMbo (481.537 MMBOE) in 352 sands in 92 fields.

Table 74 summarizes that water depths of the fields in LPL F1 range from 95-930 ft, and play interval discovery depths vary from 5,180-16,459 ft, subsea. Additionally, porosity and water saturation range from 18-37% and 16-81%, respectively.

543 Sands	Min	Mean	Max
Water depth (ft)	95	262	930
Subsea depth (ft)	5,180	9,365	16,459
Reservoirs per sand	1	2	19
Porosity	18%	29%	37%
Water saturation	16%	29%	81%

Table 74. LPL F1 sand attributes. Values are volume-weighted averages of individual reservoir attributes.

Exploration History

LPL F1 has a 36-year history of discoveries (Figure 161). The first six sands in the play were discovered in 1963 in the East Cameron 265, Eugene Island 273, South Marsh Island 79, South Timbalier 190, and South Timbalier 219 Fields. The maximum number of sands discovered in any year occurred in 1978 with 35 sands from 10 fields. However, the maximum yearly reserves of 331.448 MMBOE were added in 1972 with the discovery of 12 sands from 5 fields. Sand discoveries per year peaked from the mid-1970's through the mid-

1980's, when 311 of the play's 543 sands were discovered.

The largest sand in the play was discovered in 1977 in the High Island A571 Field and contains an estimated 117.492 MMBOE (Figure 162). Four sands containing 50-100 MMBOE have also been found in the play. The mean sand size for the play is 4.606 MMBOE. Since the first Atlas database cutoff of January 1, 1995, 51 sands have been discovered, the largest of which is estimated to contain 15.390 MMBOE.

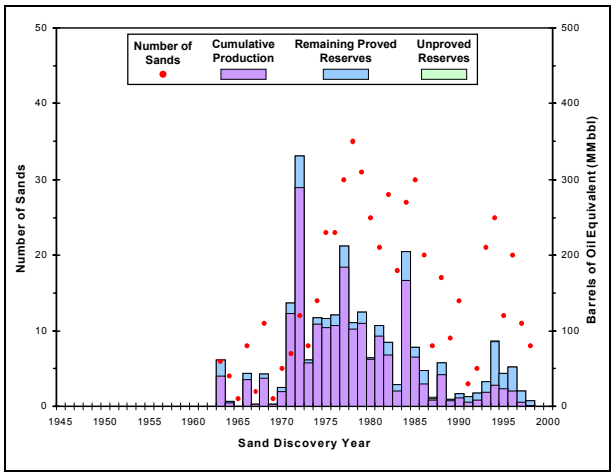

Figure 161. LPL F1 exploration history graph showing reserves and number of sands discovered by year.

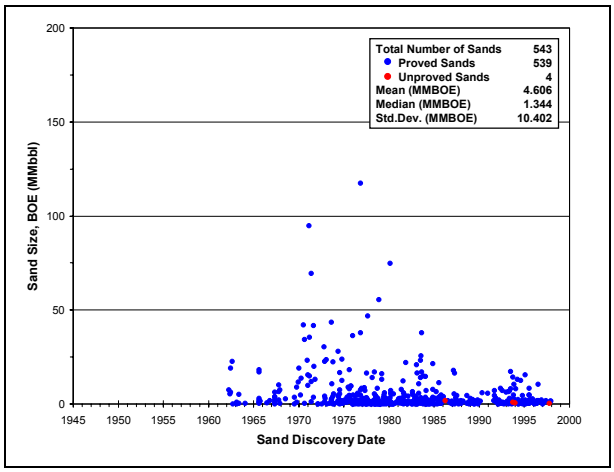

Figure 162. LPL F1 sand discovery graph showing the size of sands discovered by year.

Production History

LPL F1 has a 31-year history of production (Figure 163). Oil and gas production began in 1968. Oil production generally increased throughout the 1970's, peaking in 1984. Since then, oil production values have dropped just below this peak value, and remained fairly steady. Similarly, gas production generally increased throughout the 1970's, reaching a local peak in 1984. After fluctuating around this local peak, gas production reached its highest level ever in 1997.

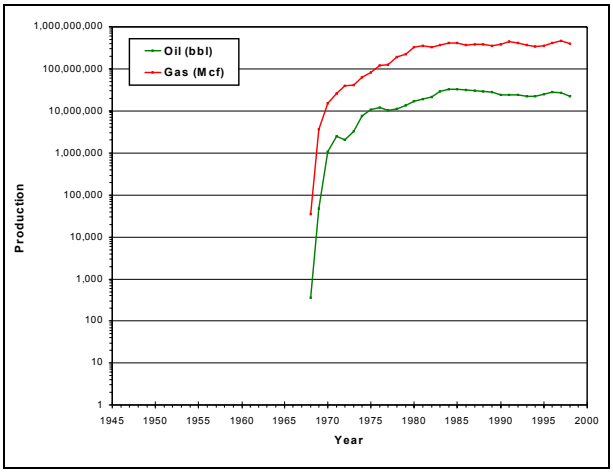

Figure 163. LPL F1 production graph showing oil and gas production by year.